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# Critical Care



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**Version 5.2**

Corrected, Updated, Lighter

PLAB 1 Keys is for **PLAB-1** and **UKMLA-AKT** (Based on the New MLA Content-Map)

With the Most Recent Recalls and the UK Guidelines

**ATTENTION:** This file will be updated online on our website frequently!

(example: **Version 2.5** is more recent than **Version 2.4**, and so on)

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**New Important points on critical care that were not  
mentioned before in the regular chapters**

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Key  
1

## **TCA (Tricyclic Antidepressant) Overdose** **(e.g. Amitriptyline)**

- ☐ Excessive sedation, **Dry mouth and skin.**
  - ☐ Sympathomimetic effect: **tachycardia**, Sweating, **Dilated Pupils.**
  - ☐ **ECG: Sinus tachycardia** (Common), **Prolongation of QRS**, QT, PR
- Dilated pupils – Dry mouth – Dry flushed skin – Drowsiness – Hypotension –  
Urine retention – Tachycardia – Severe Sedation**

☐ **ECG monitoring is essential:** Widened QRS, PR, QT and **Broad complex tachycardia.**

☐ As the patient is in severe **metabolic Acidosis**

→ **give an IV bolus of 250 ml Normal Saline (0.9%).**

**+ Sodium Bicarbonate (50 mmol IV slowly) of 8.4% NaHCO<sub>3</sub>.**

♠ **N.B.** aim for pH of 7.5-7.55!

♠ Sodium bicarbonate will correct ECG changes and cardiac rhythm.

♠ Do not forget that in a patient with amitriptyline (TCA) overdose, if he is acidotic, 2 steps to be done:

1) ECG monitoring.

2) IV fluids including Sodium Bicarbonate ( $\text{HCO}_3$ ).

In a previous exam, the candidates were asked about the dose of the Sodium Bicarbonate, the answer was:

→ IV fluids + Sodium Bicarbonate **50 ml** of **8.4%** IV.

Key  
2

## Refeeding Syndrome

A 22 YO ♀ with a BMI of  $12 \text{ kg/m}^2$  was admitted to the medical ward for feeding through a nasogastric tube. What electrolyte abnormality is expected?

→ **Hypophosphatemia** (**↓ Phosphate**)

# Refeeding Syndrome

**Starvation** [Anorexia or severe malnourishment]

**Low** Glucose = **Low** insulin / **High** Glucagon = **Increased** Gluconeogenesis

→ Depletion of phosphate stores → Hypophosphatemia

**Refeeding**

**High** Glucose = **High** insulin = **Increased** cellular uptake of phosphate

Hypophosphatemia (from **starvation**) + Phosphate demand (from **refeeding**)

→ **Severe hypophosphatemia**

- Tissue hypoxia
- Myocardial dysfunction
- Inability for diaphragm to contract

- Hypophosphatemia
- Hypokalemia
- Vitamin (thiamine) deficiencies
- Congestive heart failure
- Peripheral edema

☐ Refeeding syndrome is a syndrome consisting of metabolic disturbances that occur as a result of reinstitution of nutrition to patients who are starved, severely malnourished or metabolically stressed.

☐ When too much food and/or liquid nutrition supplement is consumed during the **initial 4 to 7 days of refeeding**, this triggers synthesis of glycogen, fat and protein in cells, to the detriment of serum concentrations of **potassium**, **magnesium** and **phosphorus** (Consumed → ↓ K<sup>+</sup>, Mg<sup>++</sup>, Phosphate).

☐ Cardiac, pulmonary and neurological symptoms can be signs of refeeding syndrome. The low serum minerals, if severe enough, can be fatal!

☐ To avoid refeeding syndrome →

Slow feeds + Give Supplements of Potassium, Magnesium and Phosphate.

**Key 3** A 36 YO man presents to the ED with a Severe headache with vomiting for 1 day. The headache started when he was lifting weights in a gym. He has photophobia and neck stiffness and GCS of 12/15. A CT head is ordered and it shows:



His BP is normal with mild tachycardia. Which drug is useful in this case?

[Aspirin ☐ or: Clopidogrel ☐ or: Sumatriptan ☐ or: ☒ Nimodipine]

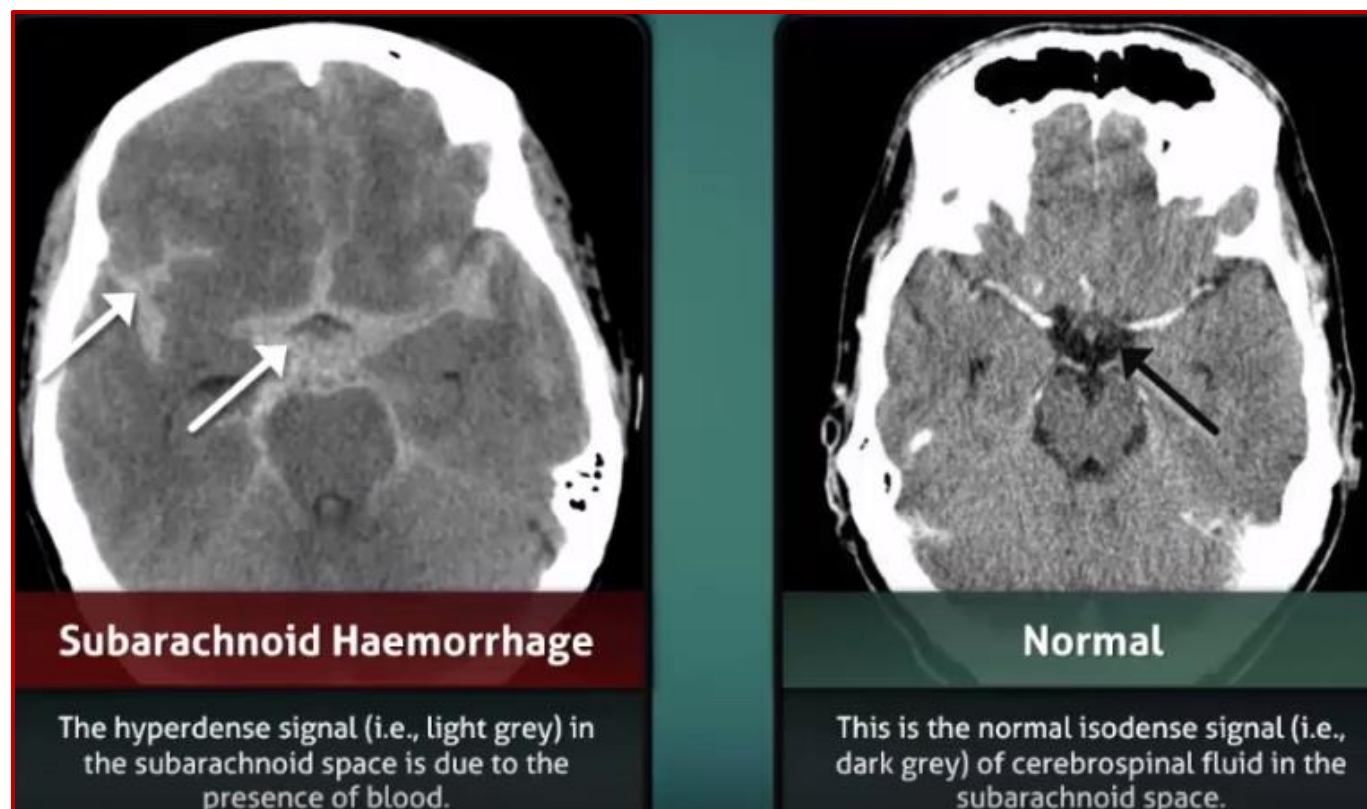
✓ Firstly, this is a case of **Subarachnoid hemorrhage (SAH)**.

✓ The hyperintense areas on the CT → blood in the subarachnoid basal cisterns.

✓ In SAH, cerebral vasospasm can occur 4-12 days later and it is serious.

☐ To diminish this anticipated cerebral vasospasm,

→ we give **Calcium Antagonist** (e.g. **Nimodipine**) for 5-14 days.



## Subarachnoid hemorrhage

◆ Occurs most commonly due to cerebral **ANEURYSM**.

◆ **Common associations:**

√ **Ehlers-Danlos Syndrome** (collagen problem “Connective Tissue Disease”).

✓ **Polycystic Kidney Disease** (ADPKD) (Hypertension and repeated kidney stones → Association: **Berry Aneurysm**, Association → **SIADH** → **Hyponatremia**. (Important ✓)

✓ **Excessive alcohol intake** is an important risk factor

◆ Usually **Sudden** and **Spontaneous**, **Very Severe** ± may be associated with **nausea, vomiting, photophobia** and/or **neck stiffness**.

◆ **Common hints:**

✓ **The worst headache in life.**

✓ **Thunderclap headache.**

✓ Feeling of “**kicked in the head**” (SEVERE headache worse at **back of head**).

✓ Severe “**Occipital**”.

✓ Meningeal irritation (**Neck stiffness, Photophobia**), **Vomiting, Collapse, Seizures**.

◆ **Dx:**

✓ **CT brain (without contrast)**

✓ If inconclusive → **LP “Lumber Puncture”** after 12 hours of the onset of the headache:

(CSF is **Bloody**, then → **Xanthochromic “Yellow”** due to bilirubin). “**Imp ✓**”

N.B. **Calcium Antagonists** (e.g. **Nimodipine**) is beneficial as it can help reduce the cerebral vasospasm that may result due to Subarachnoid hemorrhage.



**Key 4** A 36 YO presents to the ED with a Severe headache with vomiting for 1 day. The headache started when he was lifting weights in a gym. He has photophobia and neck stiffness and GCS of 12/15. A CT head was done and it did not show evidence of intracranial bleeding. What should be done next?

As the CT is inconclusive, we need to confirm SAH via:

→ **LP “Lumbar Puncture” after 12 hours of the onset of the headache**

## **Key 5** Splenic Rupture

- Common after trauma to the **left side** especially after **RTA**.
- **Manifestations:** Left side Chest and Abdomen **Bruises**, Abdominal **Distension**, **rapid fall in BP** and **rise in HR**.
- Abdominal X-ray → **Absent left psoas shadow**.
- FAST (U/S for trauma) → **free peritoneal fluids**.
- CT Abdomen → **Diagnostic**
- If confirmed → **Urgent surgery**.
- **Note:** **Subsplenic hematoma** is different from **Splenic rupture**. The former might be treated conservatively “if stable” by being **observed by the surgical team** whereas the latter (Splenic rupture) if confirmed, **urgent surgery** is required.

**A man was sitting on the passenger seat when the car went into a road traffic accident. He was hit in the left side.**

The most commonly injured organ is → **Spleen**.

**Key 6** A stem with long history of a patient after RTA being managed in a critical care unit with an X-ray showing an **Nasogastric tube being curled** above the hemidiaphragm.

**Coiled NGT after Road Traffic Accident → Diaphragmatic Rupture.**

**Key 7** A stroke patient in the critical care unit has been unable to feed orally. Therefore, an NGT is inserted for enteral feeding.

The **most accurate** way to assess the right placement of NGT is:

→ Assess the position using **Chest X-Ray**.

**Key 8** An old patient with triple vessel disease presents with sudden onset chest pain of 4 hours, shortness of breath, dizziness and sweating. His ECG shows ST depression “ischemia” in several leads. His blood pressure is 140/80. The patient is anaemic with haemoglobin level of 62 g/L. What is the most appropriate management?

→ Dual antiplatelets (Aspirin + Clopidogrel)

+ SC Fondaparinux

+ Blood transfusion.

### Notes:

✓ Triple vessel disease means that 3 big vessels (the left anterior descending, right coronary and circumflex arteries: LAD, RCA, Cx artery) have blockages from atherosclerotic plaques.

✓ This patient has ACS “acute coronary syndrome” secondary to anemia and the pre-existing triple vessel disease.

✓ Aspirin (oral) and fondaparinux (SC LMWH) are given whenever there is heart ischemia.

✓ Blood Transfusion is indicated if:

♠ **Hb < 80 g/L + Symptoms of Anemia.** Or:

♠ **HB < 70 g/L + With or Without Symptoms of Anemia.**

**Key 9** An immunocompromised elderly patient with previous history of PE and MI taking medications for COPD for 10 years. He presented complaining of breathlessness and Coughing. Pneumonia was diagnosed and he died after a few hours. X-ray showed Multiple patchy opacities. What will be filled in the 1a part of the death certificate?

- A. COPD
- B. **Pneumonia**
- C. Lung Failure
- D. Chest Infections.

### **Regarding death certificate**

- In the **1a part** of the death certificate, write the “**Disease or condition directly leading to death**” **clearly** and **specifically**.
- In **1b** part, we will write the condition that has led to 1a. In this scenario, immunosuppression is to be written in 1b.

**Examples of conditions to be written in 1a part:**

☐ Write → [**Small cell carcinoma of the main right bronchus**] instead of just “Lung cancer”.

☐ Write → **Inferior Myocardial Infarction**

Instead of “coronary thrombus/ Cardiac arrest/ Cardiovascular event/ Acute coronary syndrome...etc”

☐ Write → **Pneumonia of the left lower lobe**

Instead of “lung infection/ respiratory failure”

• **AVOID** vague terms and modes of dying such as (Respiratory distress/ Cardiac arrest/ Cardiovascular event/ Chest infections).

**Key 10** A known asthmatic child has been breathless for over 12hours. He has oxygen saturation of 86% on high flow oxygen. He has not taken his nebulisers for a day. His chest is silent. What is the most appropriate initial management?

A. IV aminophylline

B. IV magnesium sulphate

C. **Intubate and ventilate**

D. CPAP

Desaturating (Despite High Flow O<sub>2</sub>) + Silent Chest → Going into Resp. Failure  
→ **Intubate**

Key 11 **Regarding Acid-Base Imbalance** (Important):

✓ Excessive intake of Paracetamol, Aspirin, Alcohol, SSRI (e.g. Citalopram)

→ **Metabolic Acidosis.**

✓ In Asthma and COPD

→ **Respiratory Acidosis.**

✓ In Pulmonary Contusion (e.g. after a fall on the chest → Pulmonary contusion/ edema → hypoxemia and accumulation of CO<sub>2</sub>)

→ **Respiratory Acidosis.**

✓ Panic attacks AND Pulmonary embolism can cause

→ **Respiratory Alkalosis.**

However, **PaO<sub>2</sub>** is Normal in Panic attacks and Low in Pulmonary embolism.

## The steps (approach) to determine the type of the blood gas abnormality.

1. Is the patient **acidaemic** ( $\text{pH} < 7.35$ ) or **alkalaemic** ( $\text{pH} > 7.45$ )?
2. Respiratory component: What has happened to the  **$\text{PaCO}_2$** ?
  - **$\text{PaCO}_2 > 6.0$**  kPa suggests a **respiratory acidosis** (or respiratory compensation for a metabolic alkalosis)
  - **$\text{PaCO}_2 < 4.7$**  kPa suggests a **respiratory alkalosis** (or respiratory compensation for a metabolic acidosis)
3. Metabolic component: What is the **bicarbonate** level/base excess?
  - **bicarbonate  $< 22$**  mmol/l (or a base excess  $< -2$  mmol/l) suggests a **metabolic acidosis** (or renal compensation for a respiratory alkalosis)
  - **bicarbonate  $> 26$**  mmol/l (or a base excess  $> +2$  mmol/l) suggests a **metabolic alkalosis** (or renal compensation for a respiratory acidosis)

**Simply, know that  $\text{CO}_2$  is an Acid, and Bicarbonate ( $\text{HCO}_3$ ) is an Alkali.**

Key  
12

### **Glasgow Coma Scale (GCS)**

*Important, you may encounter a question that asks you to calculate the patient's GCS score.*

Eye opening	Verbal response	Motor response
4. Spontaneous	5. Oriented	6. Obeys commands
3. To speech	4. Sentences	5. Localises pain
2. To pain	3. Words	4. Flexion/withdrawal to pain
1. No response	2. Sounds	3. Abnormal flexion to pain
	1. No response	2. Extension to pain
		1. No response

✓ Total score: 15

✓ Remember: below 8 → intubate.

13-15: mild ■ 9-12: moderate ■ 3-8: severe

### Example:

**Calculate the GCS for the following patient:**

- ✓ Unintelligible sounds.
- ✓ Opens his eyes on verbal request.
- ✓ Withdraw his hand on pain stimulation.

### Answer:

- ✓ Unintelligible sounds = **2**
- ✓ Opens his eyes on verbal request = **3**
- ✓ Withdraw his hand on pain stimulation = **4**



GCS → 9

Glasgow Coma Scale		
BEHAVIOR	RESPONSE	SCORE
Eye opening response	Spontaneously	4
	To speech	3
	To pain	2
	No response	1
Best verbal response	Oriented to time, place, and person	5
	Confused	4
	Inappropriate words	3
	Incomprehensible sounds	2
	No response	1
Best motor response	Obeys commands	6
	Moves to localized pain	5
	Flexion withdrawal from pain	4
	Abnormal flexion (decorticate)	3
	Abnormal extension (decerebrate)	2
	No response	1
Total score:	<i>Best response</i>	15
	<i>Comatose client</i>	8 or less
	<i>Totally unresponsive</i>	3

Key 13 **Acute Chest Syndrome** (A complication of Sick Cell Disease)

✓ Acute chest syndrome in a patient with sickling disorder is defined by a new pulmonary infiltration on chest x-ray + at least one of the following: chest pain, cough, sputum, fever, hypoxia, (low oxygen level) and lung infiltrates. Acute

chest syndrome may be the result of sickling in the small blood vessels in the lungs causing a pulmonary infarction/embolus or viral or bacterial pneumonia.

✓ It may develop as a single event, or during a painful vaso-occlusive crisis. The clinical course is usually self-limited when small areas of the lung tissue are involved, but without proper care, acute chest syndrome can rapidly progress and result in death.

✓ **Chest pain when breathing** is the most common presenting complaint in adults. Fever, cough, tachypnea (abnormally rapid breathing), **hypoxemia** (an unusually low concentration of oxygen in the blood), or abdominal pain are common presentations for infants and children.

✓ **Rx** →

- Adequate analgesia (the patient may need to be given **morphine sulphate**),
- O<sub>2</sub>,
- Empiric antibiotics,
- Blood transfusion (not always; based on clinical picture and investigations),
- (IV fluid may worsen the pulmonary edema and thus is used with caution)

Key  
14

**Asthma exacerbation that leads to low pH, high PaCO<sub>2</sub> (i.e. Respiratory Acidosis) and fails to be managed needs to be **admitted to ICU** as the patient may require intubation.**

Key  
15

- **Hypertension**
  - **Severe chest pain radiating to the back**
  - **A big difference in the blood pressure between right and left arm**
- Suspect **Aortic dissection**

▣ **The investigation of choice (important):**

- ✓ If the patient is stable → **CT Angiography**. (= **CT of the Aorta**).
- ✓ If the patient is unstable → **Trans-oesophageal echo (TOE)** in theatre.

▣ **Important risk factors** → Marfan's syndrome ■ Ehlers-Danlos Syndrome.

▣ **Chest X-ray** → Wide mediastinum.

Key  
16

**Massive Blood Transfusion**

▣ Massive transfusion is when a patient receives **≥ 10 units** of blood (or ½ of the blood volume) **within 24 hours**.

▣ **Important complications:** "recent exam"

- ✓ **Hypocalcemia** (↓  $\text{Ca}^{++}$ ).
- ✓ **Hypomagnesemia** (↓  $\text{Mg}^{++}$ ).
- ✓ **Hypo** or **Hyperkalemia** (↑ or ↓  $\text{K}^{+}$ ).

✓ **Metabolic Alkalosis**. (Citrate is metabolised to bicarbonate → ↑ pH).

- Hypocalcemia and Hypomagnesemia can result due to citrate toxicity.
- Each unit of blood contains around 3 g of citrate.
- When citrate is high, the  $\text{Ca}^{++}$  and  $\text{Mg}^{++}$  bind to it and thus become reduced in serum.

**Do not mix things up:**

✓ **Refeeding syndrome** “starvation, low BMI, then sudden massive nutrition”  
→ **Hypophosphatemia**, hypomagnesemia, hypokalemia (↓ Phosphate,  $\text{Mg}^{++}$ ,  $\text{K}^+$ ).

✓ **Massive transfusion** can cause

→ **Hypocalcemia**, hypomagnesemia, hypo or hyperkalemia (↓  $\text{Ca}^{++}$ , ↓  $\text{Mg}^{++}$ , ↓ or ↑  $\text{K}^+$ ).

Key  
17

**Q) A few hours after surgery, a patient develops fever (40 degrees), hypotension (85/50), tachycardia (130 bpm), and tachypnea (25 breaths per minute). What is the likely diagnosis?**

- This is likely a case of post-op **sepsis**. This patient is going into **septic shock**.

- IV fluids should be given immediately. If they fail to raise the blood pressure, then it is septic shock, not just sepsis!
- Note that the **high fever** makes the diagnosis of sepsis/ septic shock more likely than hypovolemic or cardiogenic shock.

## Management of sepsis

### Red flag criteria

- Responds only to voice or pain/ or **unresponsive**.
- Acute confusional state.
- **Systolic B.P  $\leq 90$  mmHg** (or drop  $>40$  from normal).
- **Heart rate  $> 130$  per minute**.
- **Respiratory rate  $\geq 25$  per minute**.
- The patient requires oxygen to keep  $\text{SpO}_2 \geq 92\%$ .
- **Non-blanching rash**, mottled/ ashen/ cyanotic.
- Not passed urine in last 18 h/ **UO  $< 0.5$  ml/kg/hr**.
- **Lactate  $\geq 2$  mmol/l**.
- Recent chemotherapy.

If any of the red flags are present → the **'Sepsis Six'** should be started straight away:

**Give 3** → **O<sub>2</sub>, IV fluids, IV Antibiotics**

- 1) **High flow O<sub>2</sub>.**
- 2) **IV Fluids Resuscitation: NICE recommend a bolus of 500ml crystalloid over less than 15 minutes.**
- 3) **IV broad spectrum Antibiotics.**

**Take 3:**

- 1) **Blood Cultures.**
- 2) **Full blood count, U&E, Clotting factors, Lactate.**
- 3) **Start monitoring UOP (Urine Output) hourly.**

**The patient is to be ADMITTED with in-patient management.**

### **Notes:**

- Sepsis may lead to → acute kidney injury → (**oliguria, high serum urea and creatinine**).
- If the patient's BP **failed** to respond to **IV fluid** (i.e. **persistent HYPOTENSION despite appropriate IV fluid**)

→ This is called → **Septic Shock**. Otherwise, it is sepsis.

**Key 18** A 35 YO man had road traffic accident and was sent to the emergency department. He has multiple injuries to his abdomen, pelvis and thighs. X-ray reveals a fracture of his left shaft of femur. He was intubated and sent to the ICU. A few hours later, while on mechanical ventilation, he developed hypotension (85/45 mmHg) and desaturation (90%). On chest auscultation, he has decreased air entry on the left chest. The ventilator machine shows that a higher pressure is needed in order to achieve the required tidal volume. What is the likely diagnosis?

The likely diagnosis → **Tension pneumothorax**.

- One of the most common causes of tension pneumothorax is **mechanical ventilation** in patients with pleural injury. One should suspect it if a patient on mechanical ventilation suddenly deteriorates and develops low O<sub>2</sub> saturation and hypotension.

*“This patient has deteriorated suddenly after being put on mechanical ventilation”.*

- **Fat embolism** is an important differential diagnosis here as well “long bone fracture, desaturation, hypotension”.

• **However**, 2 important features mentioned in this stem makes the diagnosis of tension pneumothorax more likely, which are:

✓ Decreased air entry on one side of the chest.

✓ A higher pressure is required to achieve the target tidal volume.

Key 19 Always if O<sub>2</sub> sat < 92, the INITIAL step is to

→ **give high flow O<sub>2</sub>**

(ABC).

Key 20 Vomiting, diarrhea → Dehydration

The appropriate IV fluid is → **normal saline (0.9% NaCl)**.

Key 21

### Hemodynamics of Shock

Red arrow indicates primary abnormality	PCWP (preload)	Cardiac Output	SVR (afterload)	Treatment
Hypovolemic shock	↓	↑	↑	IV fluids
Cardiogenic shock	↑	↓	↑	Inotropes Revascularization
Distributive shock (septic, neurogenic)	↓	↑	↓	Pressors IV fluids

PCWP = pulmonary capillary wedge pressure SVR = systemic vascular resistance



In a recent exam, a scenario was given that a patient has undergone an aortic valve replacement operation. After the surgery, his blood pressure has dropped and his pulmonary capillary wedge pressure (PCWP) has raised. The only type of shock where PCWP increases is → **Cardiogenic Shock**.

Key  
22

- ✓ Hypertension (+)
- ✓ Sudden chest/ substernal pain “tearing” that radiates to the back (+)
- ✓ Big difference of blood pressure between right and left arm (>20 mmHg).
- Suspect → **Aortic dissection**.
- Give → BB, e.g., → **IV labetalol**.
- Investigations? Imp. ✓
  - If the patient is hemodynamically stable → **CT angiography of the aorta**.
  - If hemodynamically unstable → **TOE (Transoesophageal echocardiography)**.

Key  
23

A young man was found unconscious on the floor with MDMA (Ecstasy) pills in his pocket. Now in the ER, he is agitated, sweaty, and has HR of 110 and RR of 22. His limbs are rigid and his pupils are dilated. His **temperature is 40.5**. He is mechanically ventilated. What medication is useful in this case?

This is a case of MDMA (ecstasy) toxicity.

→ **Dantrolene** can be used to manage drug-induced **hyperthermia**.

## Ecstasy (MDMA) Overdose:

- Agitation, confusion, anxiety, ataxia.
- Tachycardia, hypertension
- Tachypnea.
- Thirst.
- Metabolic acidosis (e.g., ↑ venous lactic acid).
- Hyperthermia (↑ body temperature)
- Spots of colours (flashing/ flouing colours).
- Uncontrolled body movements, muscle rigidity, trismus.

## Management

- **Supportive**: ABC + treat metabolic acidosis.
- **IV diazepam** or **lorazepam**: for agitation.
- **Dantrolene** may be used for hyperthermia if simple measures fail.

Key 24 **Trauma to head + Any of the following signs:**

✓ **Hemotympanum**

= (Blood in the middle ear cavity and ecchymosis of the tympanic membrane).

- ✓ **Panda or raccoon eyes** (**Periorbital ecchymosis**).
- ✓ **Cerebrospinal fluid (CSF) leakage from ear or nose** (**CSF otorrhea ± rhinorrhea**)
- ✓ **Battle's sign** (**Mastoid ecchymosis = bruise behind ear**)

→ **Basilar skull fracture**.

The most commonly affected bone → **Temporal bone**

The answer can also be → **Middle cranial fossa fracture** (**imp.**)

*As the middle cranial fossa represents the depressed part of the skull base.*

[Base of Skull Fracture] = **Middle Cranial Fossa** Mostly → **Temporal bone fracture**



hemotympanum



Battle's sign



Raccoon eyes

**Key 25** • **Full thickness circumferential burns** affecting a limb can cause compartment syndrome (severe pain + absent or reduced pulse + paraesthesia)

→ **Urgent Escharotomy** is needed to relieve the pressure.

- **Crushing injury** causing compartment syndrome (e.g., a heavy concrete fell on a limb for a long time that has led to loss of circulation and a resultant compartment syndrome)

→ **Urgent Fasciotomy** is needed to relieve the pressure and restore the circulation.

**So:**

✓ Full thickness circumferential burns that led to compartment syndrome

→ **Urgent escharotomy**.

✓ Crushing injury that has led to compartment syndrome

→ **Urgent fasciotomy**.

**Key  
26**

Severe hypertension during intracerebral hemorrhage can be managed with

→ **Labetalol**. (Recently asked).

- **Labetalol** and **Nicardipine** are recommended for rapidly treating hypertension during cerebrovascular emergencies.

- Cerebral blood flow is not compromised with **labetalol**, making it a **desirable agent in the treatment of uncontrolled hypertension during cerebrovascular emergencies**.

- Bradycardia may occur and labetalol is generally not given if the heart rate is <60 beats per minute.

(Labetalol blocks  $\alpha$ -,  $\beta_1$ -, and  $\beta_2$ -adrenergic receptors. Due to this combined blockade of both  $\alpha$ - and  $\beta$ -receptors, cardiac output is maintained while the systemic BP is lowered).

Key  
27

## Management of COVID-19 Pneumonitis

### (In summary: For the Purpose of the Exam)

- If no hypoxia (mild covid-19) → [Supportive symptomatic Rx](#).
- If O<sub>2</sub> is required → [Simple O<sub>2</sub> delivery methods](#) (eg, nasal cannula, non-rebreathing mask) + [Dexamethasone](#); was proven to reduce mortality (trials).
- If still hypoxemic → [High flow oxygen](#) through high flow nasal cannula.
- If still, and ARDS (Adult respiratory distress syndrome) has developed → [Mechanical ventilation](#) might be needed.
- **For patients on mechanical ventilations** → opt for lung protective ventilation and alveoli recruitment strategies, which are as follows:  
Start by → **optimising PEEP** (Positive end-expiratory pressure).  
If no response → **Prone position** (also called **ventral decubitus**).

**A scenario:**

A patient is in the intensive care unit for the third day for COVID-19 pneumonitis. He is intubated and ventilated and his FiO<sub>2</sub> was set to 0.1. His arterial blood gases show: pH 7.23 (7.35-7.45), low PaO<sub>2</sub>, high PaCO<sub>2</sub>, Normal bicarbonate. His chest X-ray is as follows:



What is the most appropriate next step in management?

→ **Prone positioning.**

- The patient has adult respiratory distress syndrome (Bilateral diffuse infiltrates; bilateral white-out appearance) due to COVID-19.
- He is on maximal PEEP.
- He is still hypoxemic (low PO<sub>2</sub> and high PCO<sub>2</sub>) → respiratory acidosis.
- As he is on mechanical ventilation, lung protective ventilation and alveoli recruitment strategies → **Prone positioning**.

Key  
28

### **Aortic Dissection (in short)**

✓ Chest pain: **typically, sudden severe**, radiates to the **back/** shoulders (eg, **interscapular sudden severe pain**) and **'tearing'** in nature.

✓ Other Presenting Features: **Tachycardia, Tachypnea, Hypotension.**

✓ X-ray may show → **Widening of the mediastinum**. **Imp ✓**.

✓ Aortic regurgitation.

✓ Sometimes: a **big difference of blood pressure between right and left arms**.

✓ Hx of hypertension or trauma (as risk factors).

**Note that hypertension** is a risk factor, while **hypotension** is a presenting sign.

#### **Investigations:**

✓ If hemodynamically stable → **CT angiography** (definitive). **Imp ✓**.

- ✓ If unstable (eg, SBP < 90) → **Trans-oesophageal echocardiogram** (in theatre).
- ✓ Note: in aortic dissection, around **30% of patient would have normal ECG** features. The rest may have features of ischemia.

Key  
29

### **Points on the Management of COPD Exacerbation “imp”**

- **24% - 28% Oxygen** (not 100%) using “venturi face mask”.
  - Maintain O2 saturation between 88-92%.
  - Nebulised **salbutamol** (with **ipratropium bromide**).
  - Corticosteroids: 100 mg IV **hydrocortisone** or 30 mg prednisolone stat. (prednisolone should be continued as 30 mg OD for 7-14 days).
  - Still no response? → IV **aminophylline**.
  - If purulent sputum, fever, high CRP → give Antibiotics.
  - After giving all these medical options, if he is still dyspnoeic, with impaired blood gas showing respiratory acidosis (low Ph, high PaCO<sub>2</sub>):  
→ **Non-Invasive Ventilation** (NIV).
- NICE recommends **non-invasive ventilation** (NIV) in patients with COPD exacerbation especially if Ph is 7.25-7.35 (respiratory acidosis).
- If NIV failed or if there is impaired mental status (confusion), respiratory arrest, high aspiration risk → **Intubate and ventilate** (invasive ventilation).
  - One alternative valid answer is → **Shift patient to ICU (intensive care unit)**.



- One important indication for intubation to remember:  $GCS \leq 8$ .

Key  
30

**Types of Shock (Quick Comparison)**

		Pre-load	Pump Fn	After-load	Perfusion
		PCWP JVP	CO	SVR	O2 Sat
<b>Hypovolemic</b>	- Intravascular vol loss - hemorrhagic - fluid loss	↓	↓	↑	↓
<b>Cardiogenic</b>	- Arrhythmia - AML, valve failure - cardiomyopathy - pericarditis/PE	↑	↓	↑	↓
<b>Distributive</b>	Vasodilatory-↓↓ SVR - septic shock/SIRS/TSS - Anaphylaxis - neurogenic shock - Drug/toxin - Addisonian crisis	↓/-	↑	↓	-/↑
<b>Obstructive</b>	- Tension PTX - Tamponade - PE	↑	↓	-/↑	-/↓

PCWP = Pulmonary capillary wedge pressure.

CO = Cardiac output.

SVR = Systemic vascular resistance.

**Important:**

Normal PCWP is (6-12 mmHg). If elevated (>18), think → **Cardiogenic Shock**.

Key  
31

**Cerebral Oedema as a Complication of DKA**

- Cerebral oedema is a rare but serious complication of diabetic ketoacidosis (DKA).
- Its **symptoms** can include:
  - √ Headache.
  - √ Altered mental status.
  - √ Fundoscopy → Papilloedema.
- Rx → Give **Mannitol** (Other possible → Dexamethasone).

Key  
32

**Compartment Syndrome Quick Management:**

- If it is due to **Crush** injury → **Fasciotomy**.
- If it is due to **thermal** injury (deep dermal **burn**) → **Escharotomy**.

Key  
33**MDMA (Ecstasy) Toxicity Management**

MDMA (Ecstasy) toxicity presenting with **hyperthermia** and **muscle rigidity** can be treated with → **Dantrolene** if simple measures fail.

Key  
34**A Critical Care Scenario**

A 60-year-old woman is brought to the Emergency Department after slipping and hitting her head on a concrete floor. At the scene, she was conscious but complained of severe headache and nausea. On arrival, she is alert but disoriented. Her initial assessment reveals a Glasgow Coma Scale (GCS) score of 14. Her vital signs are as follows: heart rate of 95 beats per minute, blood pressure of 120/75 mmHg, respiratory rate of 20 breaths per minute, and oxygen saturation of 94% on room air. Over the next hour, her condition worsens; she becomes increasingly lethargic, her GCS score drops to 9, and her oxygen saturation decreases to 92% despite receiving supplemental oxygen via a nasal cannula. No other significant injuries are noted, and there is no evidence of external bleeding. What is the most appropriate immediate management for this patient?

- A. Administer high-flow oxygen through a non-rebreather mask and reassess oxygen saturation within 10 minutes
- B. Perform an immediate CT scan of the head
- C. Initiate immediate intubation to secure the airway
- D. Administer intravenous fluids and reassess GCS after fluid resuscitation
- E. Perform an immediate bedside glucose test to exclude hypoglycaemia

## Correct Answer and Explanation

The correct answer is **C. Initiate immediate intubation to secure the airway.**

Detailed Explanation:

### 1. Patient Presentation:

- The patient is a 60-year-old woman who has sustained a significant head injury after a fall.
- Initially, she is conscious but disoriented with a GCS score of 14, indicating a mild level of brain injury but no immediate concerns about severe brain injury.
- Her vital signs are relatively stable, with a heart rate of 95 beats per minute, a blood pressure of 120/75 mmHg, a respiratory rate of 20 breaths per minute, and an oxygen saturation of 94%.

### 2. Clinical Deterioration:

- Within an hour, the patient's condition deteriorates significantly:
  - Her GCS score drops from 14 to 9, indicating a severe decline in her level of consciousness.
  - Her oxygen saturation falls to 92% despite supplemental oxygen via nasal cannula, showing inadequate oxygenation.

### 3. Assessment of Options:

**A. Administer high-flow oxygen through a non-rebreather mask and reassess oxygen saturation within 10 minutes: (Invalid)**

- While this might temporarily improve oxygenation, it does not address the severe decline in the patient's level of consciousness and the potential airway compromise.

**B. Perform an immediate CT scan of the head: (Invalid)**

- A CT scan is important to assess the extent of the head injury, but the immediate priority is to manage the patient's airway due to the drop in GCS and oxygen saturation.

**C. Initiate immediate intubation to secure the airway: (Valid)**

- With a GCS score of 9, the patient is at significant risk of losing her airway protection. Intubation is necessary to ensure a secure airway, adequate ventilation, and oxygenation.

**D. Administer intravenous fluids and reassess GCS after fluid resuscitation: (Invalid)**

- There is no indication of hypovolemia or shock in this scenario, and fluid resuscitation will not address the primary issue of airway compromise.

**E. Perform an immediate bedside glucose test to exclude hypoglycaemia: (Invalid)**

- Although hypoglycemia can cause altered mental status, there is no indication in this scenario that it is the primary issue. The critical concern here is airway management.

**Conclusion:**

In trauma patients with a rapidly declining GCS, the **priority** is to secure the airway to prevent hypoxia and ensure adequate ventilation. The most appropriate and immediate management step in this scenario is to initiate intubation.

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